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(72)Inventor :   HIDA MASAKO
                          IBATA MITSUNORI

(54) NETWORK AND INHOUSE NETWORK

(57)Abstract:

PROBLEM TO BE SOLVED: To allow a network to satisfy requirements of a telephone service where real time performance in essential when the network is overloaded because much traffic is in existence in the Internet used of a channel.

SOLUTION: In this inhouse network 1 having a private branch exchange(PBX) 12, an Ethernet for communication between terminals, and an Internet telephony server(ITS) 13 that makes communication through an Internet/intra-net 3, when an Internet telephone call via the Internet/intra-net 3 is used for a call other than the inhouse network 1, the network 1 has a function of discriminating whether or not the Internet/intra-net 3 is overloaded. In the case that the function discriminates an overload state of the Internet/intra-net 3, the function sets the PBX 12 to regard as if a leased line trunk were busy. Then the PBX 12 directs the call to a public telephone network 2 not through the Internet/intra-net 3.
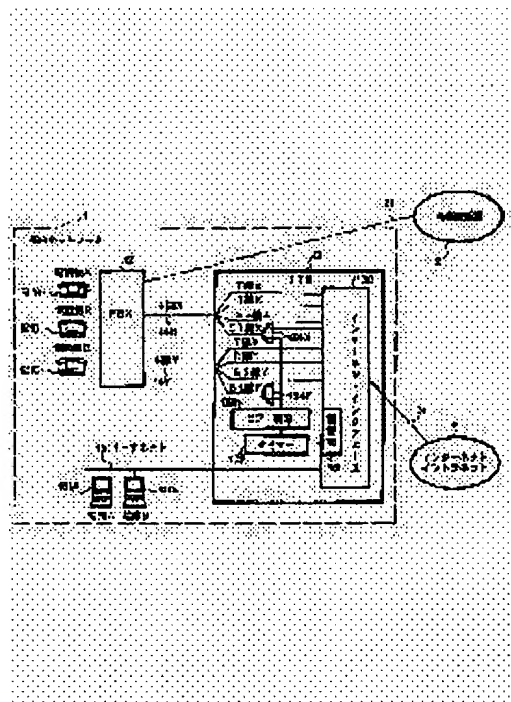
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CLAIMS

[Claim(s)]
[Claim 1] By registering beforehand correspondence with the telephone number defined by dedicated line and the telephone number of a public telephone network The private-telephone-network exchange which has a detour function to said public telephone network when a private line trunk is a busy condition (PBX is called hereafter), The Internet telephony server which unifies Ethernet for a communication link between terminals, voice of said PBX, and data of said Ethernet, and communicates with the Internet/intranet In a network which has (ITS is called hereafter) to a message of those other than an in-house-network When using an Internet telephone of said Internet / intranet course By having a function to judge that said Internet/intranet are in an overload condition, and making said private line trunk look like a busy condition to said PBX, when it is judged that it is in said overload condition A network characterized by making it bypass from said PBX to said public telephone network, without letting said Internet/intranet pass.
[Claim 2] The private branch exchange which has a detour function to said public telephone network when said yard line is a busy condition by registering beforehand correspondence with the telephone number defined by yard line and the telephone number of a public telephone network The Internet telephony server which communicates with the Internet/intranet linked to said private branch exchange (ITS is called hereafter) When it is the network equipped with the above and uses an Internet telephone of said external Internet / intranet course via said ITS with the telephone line of said private branch exchange By having a function to judge that said Internet/intranet are in an overload condition, and making said private line trunk look like a busy condition to said PBX, when it is judged that it is in said overload condition It is characterized by making it bypass from said PBX to said public telephone network, without letting said Internet/intranet pass.
[Claim 3] The private branch exchange which registers into a telephone number registration table correspondence with the telephone number defined by dedicated line and the telephone number of a public telephone network, and is switched to said public telephone network when said dedicated line is a busy condition The Internet telephony server which is connected to said private branch exchange and communicates with the Internet/intranet (ITS is called hereafter) A public telephone network which is the in-house network equipped with the above, and is connected to said private branch exchange, When using an Internet telephone of said external Internet / intranet course via said ITS By having a function to judge that said Internet/intranet are in an overload condition, and making said dedicated line look like a busy condition to said PBX, when it is judged that it is in said overload condition It is characterized by making it bypass from said PBX to said public telephone network, without letting said Internet/intranet pass.
[Claim 4] A function to judge that it is in said overload condition is an in-house network according to claim 3 characterized by for an Internet telephone of said Internet / intranet course registering a busy time zone which becomes a busy, and exchanging the busy time zone concerned for said public telephone network noting that it is in an overload condition in study.
[Claim 5] It is the in-house network according to claim 3 characterized by exchanging said PBX for said

public telephone network when the response time to an external Internet telephone machine is long and a function to judge that it is in said overload condition is judged to be an overload condition by network control within the Internet interface linked to said Internet/intranet.

[Claim 6] A function to judge that it is in said overload condition When the time of day and response time are learned for every message and said response time does not come on the contrary within convention time amount, judge it as loaded condition, register the time of day into a load time-of-day table, and if said response time is said less than convention time amount The time of day is deleted from said load time-of-day table. Said load time-of-day table An in-house network according to claim 3 which is judging it as an overload condition when a timer in said ITS is interlocked with, said load time-of-day table and present time of day are compared and said registered time of day comes, and is characterized by activating a busy signal in order to consider as said overload condition.

[Claim 7] A function to judge that it is in said overload condition The Ping frame is periodically transmitted to the points (a provider's server, the communications-partner point, etc.) of arbitration. Learn the time of day and response time, register with a load time-of-day table, and said load time-of-day table and present time of day are compared. When said registered time of day comes, are judging it as an overload condition, or said Ping frame is transmitted to real time. An in-house network according to claim 3 characterized by activating a busy signal when predetermined time is exceeded for the time of day and response time as compared with predetermined time.

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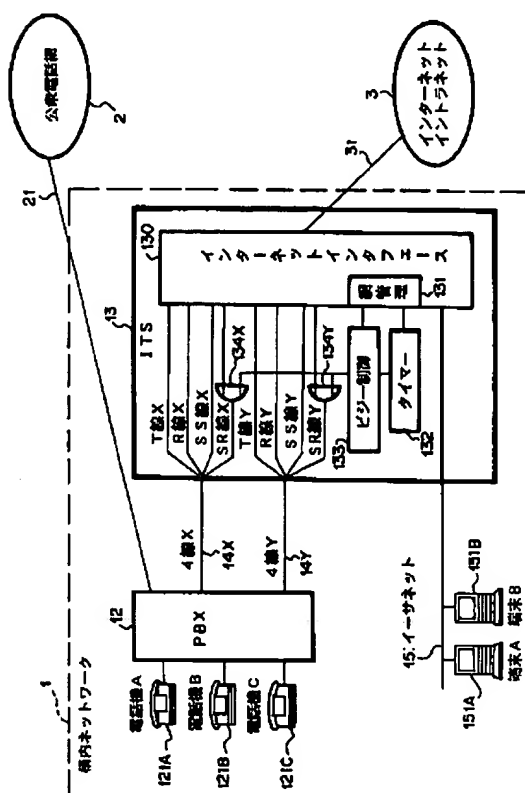
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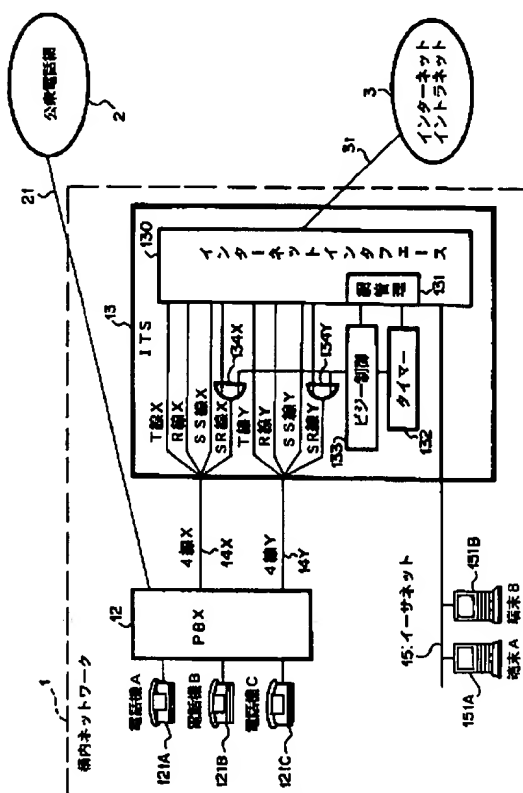
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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] This invention relates to NEWWAKU and the in-house network using a congestion detour device of the private in-plant system and Internet telephone which have a detour function within a private in-plant system in the case of an overload condition about NEWWAKU and the in-house network which used the congestion detour function of Internet telephones, such as the Internet / intranet / extranet.
[0002]
[Description of the Prior Art] The Internet connects a bond and a local network like LAN with a dedicated line mutually for a network and a network one after another, is the network which enabled it to cover a large area, and is used for online communications, such as a personal computer. Moreover, there is no exchange used for a public line etc., and the router put on the local network chooses a path, and transmits the data signal to the bucket brigade type one after another. Since the packet communication suitable for sending the data of a computer is used, a router reads the address attached to the packet and sends a packet to the router of the next network.
[0003] Moreover, intranet is a computer network for using only in the company. When it compares to a telephone, the Internet is a common telephone network freely covered also over a foreign country by dial direct communication, and intranet is equivalent to the extension telephone are telephoned only in the company.
[0004] Moreover, it can talk between personal computers through the Internet circuit using the microphone and loudspeaker tied to a personal computer, and it is charm that an Internet telephone, a call, and phonecall charges require only the city tariff to a nearby access point from a self personal computer, and this is telephoned at a low tariff.
[0005]
[Problem(s) to be Solved by the Invention] However, in Internet-based phone services, when there is much traffic volume of the Internet/intranet made into a speech path and it is in an overload condition, a time delay also becomes large and has the trouble that the conditions as a call service that real-time requirement is required cannot be fulfilled. Generally, although the tolerance of a time delay is called less than 200 [ms] by general telephone and is called less than 500 [ms] by the Internet telephone, when the Internet/intranet made into a speech path are in an overload condition, the very big time delay of a second unit is observed, and a time delay may become large rather than an international message. In that case, when considering as packet transmission, the continuity of the telephone line will not be maintained, but audio blocking will occur frequently, and a mutual message will become impossible in an Internet telephone.
[0006] Moreover, in an Internet telephone, if the receiving gap of a voice frame is sparse, and fluctuation is large and discards a voice frame in large quantities by the fluctuation absorption control function, in order to packet-ize voice to fixed length and to communicate, conversation will break off, or noises, such as "BUBBUTSU", will enter and voice quality will also deteriorate.

[0007] For this reason, when current judges whether the Internet/intranet is used or the conventional public telephone network is used, and dials, or it is hard to catch from the time zone which the user of an Internet telephone uses, once telephoning, it applies it again by the public telephone network. Now, for a user, it is inconvenient, and also in order to utilize the advantage of a cheap Internet telephone, it is the semantics which aims at use expansion, and it is necessary to solve the above-mentioned trouble.
[0008]
[Means for Solving the Problem] By this invention's solving the above-mentioned trouble and registering beforehand correspondence with the telephone number defined by dedicated line and the telephone number of a public telephone network - private-telephone-network exchange which has a detour function to a public telephone network when a private line trunk is a busy condition (PBX is called hereafter), In a network which has the Internet telephony server (ITS is called hereafter) which unifies Ethernet for a communication link between terminals, voice of PBX, and data of Ethernet, and communicates with the Internet/intranet By case where an Internet telephone of the Internet / intranet course is used for a message of those other than an in-house network By having a function to judge that the Internet/intranet is in loaded condition, and pretending to be a private line trunk busy condition to PBX, when it is judged that it is loaded condition It is characterized by making it bypass from PBX to a public telephone network, without letting the Internet/intranet pass.
[0009] This invention moreover, by registering beforehand correspondence with the telephone number defined by yard line and the telephone number of a public telephone network The private branch exchange which has a detour function to said public telephone network when said yard line is a busy condition, In a network which has the Internet telephony server (ITS is called hereafter) which communicates with the Internet/intranet linked to said private branch exchange When using an Internet telephone of said external Internet / intranet course via said ITS with the telephone line of said private branch exchange By having a function to judge that said Internet/intranet are in an overload condition, and making said private line trunk look like a busy condition to said PBX, when it is judged that it is in said overload condition It is characterized by making it bypass from said PBX to said public telephone network, without letting said Internet/intranet pass.
[0010] Furthermore, the private branch exchange which this invention registers into a telephone number registration table correspondence with the telephone number defined by dedicated line and the telephone number of a public telephone network, and is switched to said public telephone network when said dedicated line is a busy condition, In an in-house network which has the Internet telephony server (ITS is called hereafter) which is connected to said private branch exchange and communicates with the Internet/intranet When using an Internet telephone of said external Internet / intranet course via said ITS with a public telephone network linked to said private branch exchange By having a function to judge that said Internet/intranet are in an overload condition, and making said dedicated line look like a busy condition to said PBX, when it is judged that it is in said overload condition It is characterized by making it bypass from said PBX to said public telephone network, without letting said Internet/intranet pass.
[0011] Moreover, in the above-mentioned invention, an Internet telephone of said Internet / intranet course registers in study a busy time zone which becomes a busy, and a function to judge that it is in said overload condition is characterized by exchanging the busy time zone concerned for said public telephone network noting that it is in an overload condition.
[0012]
[Embodiment of the Invention] The operation gestalt of [configuration of operation gestalt] this invention is explained to details, referring to a drawing.
[0013] Drawing 1 is the block diagram showing the configuration by the operation gestalt of this invention. In drawing, they are each telephone sets A, B, and C by which the in-house network in which 1 includes a telephone and a personal computer terminal, and 12 were connected to the private branch exchange PBX (Private Branch Exchange), and 121A, 121B, and 121C were connected to PBX.
[0014] Moreover, 13 is connected using the server and dedicated line in the global world. Or the Internet/intranet which connects a telephone and a data circuit between the head office and interplant in

a company, and a head office and a branch etc., and connection ITS (Internet telephony server) The Internet interface with which 130 becomes the buffer [exterior] of I/O within ITS13, An OR circuit, and 14X and 14Y of the network control which manages the communication network with which ITS manages 131 as a server, the timer which 132 measures the present time amount and counts time amount, the busy control to which 133 outputs loaded condition, and 134X and 134Y are four lines X and Y. Moreover, the Ethernet with which 15 constitutes LAN, the personal computer terminal by which 151A and 151B were connected to Ethernet 15, The public telephone network by which 2 was connected to PBX12, two lines to which 21 connects a public telephone network 2, The Internet/intranet including the extranet which 3 was connected with the dedicated line all over the world, or constituted the communication network in a company, and was further constituted in expansion in the enterprise group, 31 shows the cable of arbitration which connects the Internet / intranet 3 with the Internet interface 130.

[0015] An in-house network 1 communicates with the terminal connected with the telephone set which consisted of a telephone set 121, a terminal 151, PBX12, Ethernet 15, and ITS13, connected with a public telephone network 2, or the Internet/intranet 3, and was connected to public telephone networks 2 other than in-house network 1, or the Internet/intranet 3.

[0016] Moreover, PBX12 holds telephone sets 121A, 121B, and 121C, and offers voice communication service which performs not only the private branch exchange but exchange with the exterior. Ethernet 15 holds the personal computer terminals 151A and 151B, and it performs the data transmission services which attain high-speed-data transmission, planning collision prevention by CSMA/CD by 10BASE-5, 10BASE-F, 100BASE-T, etc. Moreover, Ethernet 15 may constitute LAN containing a token ring, ATM network exchange, FDDI, etc., and may contain WAN and the wireless LAN of a wide area network.

[0017] Furthermore, ITS13 holds PBX12 and Ethernet 15, and offers joint communication service of the voice via the Internet, and data.

[0018] PBX12 and ITS13 A transmitting line (T line is called hereafter) and a receiving line (R line is called hereafter), The cable which makes one pair a transmitting initiation line (SS line is called hereafter) and four signal lines of an arrival-of-the-mail initiation line (SR line is called hereafter) It connects by (four lines are called hereafter), and PBX12 and a public telephone network 2 are connected by 2 of T line and R line lines, and ITS13, and the Internet/intranet 3 are connected by the cables 31, such as a coaxial cable of arbitration, and a twisted pair wire, an optical fiber.

[0019] The [explanation of actuation of this operation gestalt] PBX 12 has the function bypassed to a public telephone network 2 at the time of a private line trunk busy as conventional technology. This actuation is explained using drawing 1 .

[0020] Three sets of telephone set A121A, B121B, and C121C are connected to PBX12, PBX12 and ITS13 are two lines [four] 14X and 14Y, and PBX12 and a public telephone network 2 are connected by one line [two] 21.

[0021] First, if telephone set A121A carries out call origination towards other telephone sets in the condition that anything does not have a message, through ITS13 by the Internet / intranet 3 course, PBX12 will talk over the telephone by SR line of an arrival-of-the-mail initiation line choosing 4 line X14X of an Off condition. The sequence to a message is shown in drawing 2 . If telephone set A121A and dial-in of a phase hand's telephone number is carried out in usual call origination actuation of drawing 2 PBX12 turns on SS line of a transmitting initiation line to ITS13 according to the telephone number, and connect with ITS to which a phase hand's telephone set is connected through the Internet / intranet 3, and it turns on a phase hand's ITS. If off-Hook [a phase hand's telephone set / a ringing is carried out and / a phase hand's telephone set], SS line of a transmitting initiation line is turned on from a phase hand's PBX. A connection response is connected to ITS13 through the Internet / intranet 3, SR line is turned on, a ring back tone is generated in telephone set A121A, and a phase hand's telephone set and a message are attained henceforth. In this way, when T line of a transmitting line and R line of a receiving line turn on and all the 4 line X14X turns on, the message by the mutual telephone set is maintained.

[0022] Next, if telephone set B121B carries out call origination towards the phase hand telephone set of

an external Internet telephone through the Internet / intranet 3, SR line will choose 4 line Y14Y of an Off condition, and PBX12 will talk over the telephone. Thereby, the SR line Y of 4 line Y14Y changes to On.

[0023] If telephone set C121C carries out call origination of all the four lines X and Y towards the phase hand telephone set of an external Internet telephone during use by this in-house network 1 through the Internet / intranet 3, since all SR lines are in On condition, PBX12 will change a number to be dialed into the telephone number of a public telephone network 2 with the telephone number translation table set up beforehand, and will talk over the telephone, without letting a dedicated line pass.

[0024] On the other hand, ITS13 has the function which encapsulates the voice of PBX12, and the data of Ethernet 15 with the IP (Internet Protocol) frame, and communicates by the Internet / intranet 3 course as conventional technology. It explains using drawing 1 . PBX12 and Ethernet 15 are connected to ITS13, and the Internet / intranet 3 is connected by the cable 31 of arbitration. The voice of PBX12 is encoded / decrypted with the Internet interface 130, and communicates by the Internet / intranet 3 course with the IP frame of fixed length. On the other hand, the data of Ethernet 15 communicates with the IP frame of arbitration length with the Internet interface 130 at the Internet / intranet 3 course.

[0025] With such a configuration, since it gives priority to the voice communication than to which greater importance is attached to real-time requirement when the voice communication of PBX12 and the data communication of Ethernet 15 occur in coincidence, in the Internet interface 130, ITS13 divides the queue of voice and data, and a priority control is performed or it also has the function which divides a data frame into a short frame and lets a voice frame pass between data frames.

[0026] Moreover, in the voice communication than to which greater importance is attached to real-time requirement, if the receiving gap of a voice frame is sparse, since it swings when reproducing voice, or the noise of "BUTSUBUTSU" enters and voice quality worsens, when the receiving gap of a voice frame exceeds fixed time amount, in the Internet interface 130, it also has the delay fluctuation control function of discarding the voice frame.

[0027] With this operation gestalt, to the above-mentioned function, in addition, in order to raise Internet-based phone services, using effectively the detour function to the public telephone network at the time of the private line trunk busy of PBX12 The network control 131 which supervises the traffic volume of the frame which occurs in an in-house network 1 in ITS13, and flows the arbitration cable 31 to it, or supervises the loaded condition of the Internet / intranet 3, The timer 132 which sets up time of day, and three functions of the busy control 133 which controls the use propriety of the Internet / intranet 3, SR line of the arrival-of-the-mail initiation line outputted to PBX12 from the Internet interface 130 of ITS13, the signal line outputted from busy control 133, and OR circuits 134X and 134Y for joining together in OR logic are added.

[0028] The voice which generates a network control 131 in an in-house network 1, and is communicating by the Internet / intranet 3 course, While supervising the line failure of the traffic volume of data, and the cable 31 of arbitration, and the number of frame abandonment by fluctuation absorption In order to judge the loaded condition of the Internet / intranet 3, when the time of day and response time are learned for every message and a response does not come on the contrary within convention time amount, it is judged as loaded condition. The time of day is registered into a load time-of-day table, or if it is less than convention time amount, the time of day will be deleted from a load time-of-day table.

[0029] Moreover, the ping frame is periodically transmitted to the points (a provider's server, the communications-partner point, etc.) of arbitration, time amount (round-trip-delay time amount is called hereafter) until a response comes on the contrary is observed, it registers with an above-mentioned load time-of-day table, or a signal is changed into On condition on real time at busy control 133, and, in within convention time amount, a signal is changed into an Off condition.

[0030] Moreover, when the traffic volume of the cable 31 of arbitration exceeds default value, a line failure is detected or the number of voice frame abandonment per unit time amount by fluctuation absorption control exceeds the number of conventions, a signal is changed into On condition to busy control 133, and when traffic volume and the number of voice frame abandonment are less or line failure

restoration is detected, a signal is changed into an Off condition.

[0031] The timer 132 predicts and sets up the time zone of the overload of the Internet / intranet 3 beforehand (from 22:00 to 8:00 [for example,]), and the set-up time zone makes busy control 133 generate a signal.

[0032] When it considers as a busy condition when beyond the convention time amount of the round-trip-delay time amount which a network control 131 outputs in consideration of a SURESHI hold from a carrier beam signal is carrying out arbitration time amount continuation from the network control 131 or the timer 132, and less than convention time amount is carrying out arbitration time amount continuation, busy control 133 generates the signal whose Internet / intranet 3 are busy conditions, and changes all SR lines into On condition through OR circuits 134X and 134Y, such as canceling a busy condition.

[0033] Since the signal which notifies a busy condition is notified to PBX12 through OR circuits 134X and 134Y, when there are four lines in use by message, even if it is continued and a message completes the message, SR line of an arrival-of-the-mail initiation line does not return to an Off condition.

[0034] PBX12 judges that all SR lines are in On condition with a private line trunk busy, a number to be dialed is changed into the telephone number of a public telephone network 2 with the telephone number translation table set up beforehand, and it talks over the telephone, without letting a dedicated line pass.

[0035] The call origination actuation at the time of this trunk busy is explained referring to drawing 2 . For example, since all SR lines of ITS13 are ON states when telephone set A121A and dial-in of a phase hand's telephone number is carried out, it connects with a direct public telephone network, and PBX12 receives a message in a phase hand's PBX, and generates a ringing to a phase hand's telephone set. If off-Hook [a phase hand's telephone set], the reply signal will be transmitted to PBX12, a ring back tone will be generated in telephone set A121A, and a phase hand's telephone set and a message will be attained henceforth. It lets a public telephone network 2 pass, and the message by the mutual telephone set is maintained. In this case, although explained that a phase hand's telephone sets are this in-house network and the same network, when a phase hand's telephone set is connected to the provider and the public telephone network and this in-house network is not a busy condition, through above-mentioned Internet/intranet, an Internet telephone will be possible and it will talk over the telephone through a public telephone network mutually at the time of a busy condition.

[0036] The telephone number defined by the configuration and actuation of the above each part by the dedicated line connected to the Internet / intranet 3, By registering beforehand correspondence with the telephone number of a public telephone network 2 into a telephone number translation table, and transforming the telephone number into the telephone number of a public telephone network 2 by turns PBX of the private-telephone-network exchange which has a detour function to a public telephone network 2 when a private line trunk is a busy condition, By the in-house network which has the Internet telephony server ITS which unifies the Ethernet for the communication link between terminals, the voice of PBX, and the data of Ethernet, and communicates with the Internet/intranet By ITS13 which operates also as a provider, the high time zone of the probability for a busy to occur is set as a busy condition, and it connects with the priority to a public telephone network.

[0037] Moreover, it has the congestion detour function of the Internet telephone of making it bypass from PBX12 to a public telephone network 2 by having the function to judge that the Internet / intranet 3 is in loaded condition, and pretending to be it to PBX12 by the case where the Internet telephone of the Internet / intranet 3 course is used, at a private line trunk busy condition, when it is judged to the message of those other than in-house network 1 that it is in an overload condition, without letting the Internet / intranet 3 pass.

[0038] Here, the function to judge that the Internet/intranet is loaded condition has the following logic and load time-of-day tables, [for the purpose of these], it uses properly, or it is combined, and provides ITS13 with service.

(1) When the time of day and response time are learned for every message and a response does not come on the contrary within convention time amount, judge it as loaded condition and register the time of day into a load time-of-day table. On the other hand, if it is less than convention time amount, the time of

day will be deleted from a load time-of-day table. If a load time-of-day table is interlocked with a timer and becomes the registered time of day, it will activate a busy signal.
(2) Transmit the Ping frame to the points (a provider's server, the communications-partner point, etc.) of arbitration periodically, learn the time of day and response time, and when it registers with a load time-of-day table like (1) or there is no response from the Internet/intranet actually from a network control, activate a busy signal through busy control on real time.
[0039]
[Effect of the Invention] By this invention, even if an Internet telephone service user does not know the number of a public telephone network, by inputting the number to be dialed of a dedicated line, he can talk over the telephone by the optimal root, and can avoid the troublesome problem in conversation, such as delay and a sound piece.
[0040] Moreover, in order to prevent the quality deterioration with the frame waste ratio not only by a time delay but the traffic volume and the fluctuation absorption function in equipment by taking in this invention A trunk busy condition is intentionally made in the midnight time zone when the Internet will be in an overload condition, using a timer in making a trunk busy condition ****. Use of the Internet is avoided, or a trunk busy condition is made at the time of the network failure detection of the Internet/intranet, and it becomes possible to take failure correspondence and the precaution of bypassing to a public telephone network.
[0041] In this invention, since the function was added to the ITS side based on the conventional technology of PBX and there is no modification in the interface between the PBX itself, and PBX and ITS, it is applicable to preparation to a dedicated network.

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TECHNICAL FIELD

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PRIOR ART

[Description of the Prior Art] The Internet connects a bond and a local network like LAN with a dedicated line mutually for a network and a network one after another, is the network which enabled it to cover a large area, and is used for online communications, such as a personal computer. Moreover, there is no exchange used for a public line etc., and the router put on the local network chooses a path, and transmits the data signal to the bucket brigade type one after another. Since the packet communication suitable for sending the data of a computer is used, a router reads the address attached to the packet and sends a packet to the router of the next network.

[0003] Moreover, intranet is a computer network for using only in the company. When it compares to a telephone, the Internet is a common telephone network freely covered also over a foreign country by dial direct communication, and intranet is equivalent to the extension telephone are telephoned only in the company.

[0004] Moreover, it can talk between personal computers through the Internet circuit using the microphone and loudspeaker tied to a personal computer, and it is charm that an Internet telephone, a call, and phonecall charges require only the city tariff to a nearby access point from a self personal computer, and this is telephoned at a low tariff.

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EFFECT OF THE INVENTION

[Effect of the Invention] By this invention, even if an Internet telephone service user does not know the number of a public telephone network, by inputting the number to be dialed of a dedicated line, he can talk over the telephone by the optimal root, and can avoid the troublesome problem in conversation, such as delay and a sound piece.
[0040] Moreover, in order to prevent the quality deterioration with the frame waste ratio not only by a time delay but the traffic volume and the fluctuation absorption function in equipment by taking in this invention, A trunk busy condition is made, or a trunk busy condition is intentionally made in the midnight time zone when the Internet will be in an overload condition using a timer, use of the Internet is avoided, or a trunk busy condition is made at the time of the network failure detection of the Internet/intranet, and it becomes possible to take failure correspondence and the precaution of bypassing to a public telephone network.
[0041] In this invention, since the function was added to the ITS side based on the conventional technology of PBX and there is no modification in the interface between the PBX itself, and PBX and ITS, it is applicable to preparation to a dedicated network.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, in Internet-based phone services, when there is much traffic volume of the Internet/intranet made into a speech path and it is in an overload condition, a time delay also becomes large and has the trouble that the conditions as a call service that real-time requirement is required cannot be fulfilled. Generally, although the tolerance of a time delay is called less than 200 [ms] by general telephone and is called less than 500 [ms] by the Internet telephone, when the Internet/intranet made into a speech path are in an overload condition, the very big time delay of a second unit is observed, and a time delay may become large rather than an international message. In that case, when considering as packet transmission, the continuity of the telephone line will not be maintained, but audio blocking will occur frequently, and a mutual message will become impossible in an Internet telephone.
[0006] Moreover, in an Internet telephone, if the receiving gap of a voice frame is sparse, and fluctuation is large and discards a voice frame in large quantities by the fluctuation absorption control function, in order to packet-ize voice to fixed length and to communicate, conversation will break off, or noises, such as "BUBBUTSU", will enter and voice quality will also deteriorate.
[0007] For this reason, when current judges whether the Internet/intranet is used or the conventional public telephone network is used, and dials, or it is hard to catch from the time zone which the user of an Internet telephone uses, once telephoning, it applies it again by the public telephone network. Now, for a user, it is inconvenient, and also in order to utilize the advantage of a cheap Internet telephone, it is the semantics which aims at use expansion, and it is necessary to solve the above-mentioned trouble.

[Translation done.]

* NOTICES *

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MEANS

[Means for Solving the Problem] By this invention's solving the above-mentioned trouble and registering beforehand correspondence with the telephone number defined by dedicated line and the telephone number of a public telephone network - private-telephone-network exchange which has a detour function to a public telephone network when a private line trunk is a busy condition (PBX is called hereafter), In a network which has the Internet telephony server (ITS is called hereafter) which unifies Ethernet for a communication link between terminals, voice of PBX, and data of Ethernet, and communicates with the Internet/intranet By case where an Internet telephone of the Internet / intranet course is used for a message of those other than an in-house network By having a function to judge that the Internet/intranet is in loaded condition, and pretending to be a private line trunk busy condition to PBX, when it is judged that it is loaded condition It is characterized by making it bypass from PBX to a public telephone network, without letting the Internet/intranet pass.
[0009] This invention moreover, by registering beforehand correspondence with the telephone number defined by yard line and the telephone number of a public telephone network The private branch exchange which has a detour function to said public telephone network when said yard line is a busy condition, In a network which has the Internet telephony server (ITS is called hereafter) which communicates with the Internet/intranet linked to said private branch exchange When using an Internet telephone of said external Internet / intranet course via said ITS with the telephone line of said private branch exchange By having a function to judge that said Internet/intranet are in an overload condition, and making said private line trunk look like a busy condition to said PBX, when it is judged that it is in said overload condition It is characterized by making it bypass from said PBX to said public telephone network, without letting said Internet/intranet pass.
[0010] Furthermore, the private branch exchange which this invention registers into a telephone number registration table correspondence with the telephone number defined by dedicated line and the telephone number of a public telephone network, and is switched to said public telephone network when said dedicated line is a busy condition, In an in-house network which has the Internet telephony server (ITS is called hereafter) which is connected to said private branch exchange and communicates with the Internet/intranet When using an Internet telephone of said external Internet / intranet course via said ITS with a public telephone network linked to said private branch exchange By having a function to judge that said Internet/intranet are in an overload condition, and making said dedicated line look like a busy condition to said PBX, when it is judged that it is in said overload condition It is characterized by making it bypass from said PBX to said public telephone network, without letting said Internet/intranet pass.
[0011] Moreover, in the above-mentioned invention, an Internet telephone of said Internet / intranet course registers in study a busy time zone which becomes a busy, and a function to judge that it is in said overload condition is characterized by exchanging the busy time zone concerned for said public telephone network noting that it is in an overload condition.
[0012]
[Embodiment of the Invention] The operation gestalt of [configuration of operation gestalt] this

invention is explained to details, referring to a drawing.

[0013] Drawing 1 is the block diagram showing the configuration by the operation gestalt of this invention. In drawing, they are each telephone sets A, B, and C by which the in-house network in which 1 includes a telephone and a personal computer terminal, and 12 were connected to the private branch exchange PBX (Private Branch Exchange), and 121A, 121B, and 121C were connected to PBX.

[0014] Moreover, 13 is connected using the server and dedicated line in the global world. Or the Internet/intranet which connects a telephone and a data circuit between the head office and interplant in a company, and a head office and a branch etc., and connection ITS (Internet telephony server) The Internet interface with which 130 becomes the buffer [exterior] of I/O within ITS13, An OR circuit, and 14X and 14Y of the network control which manages the communication network with which ITS manages 131 as a server, the timer which 132 measures the present time amount and counts time amount, the busy control to which 133 outputs loaded condition, and 134X and 134Y are four lines X and Y. Moreover, the Ethernet with which 15 constitutes LAN, the personal computer terminal by which 151A and 151B were connected to Ethernet 15, The public telephone network by which 2 was connected to PBX12, two lines to which 21 connects a public telephone network 2, The Internet/intranet including the extranet which 3 was connected with the dedicated line all over the world, or constituted the communication network in a company, and was further constituted in expansion in the enterprise group, 31 shows the cable of arbitration which connects the Internet / intranet 3 with the Internet interface 130.

[0015] An in-house network 1 communicates with the terminal connected with the telephone set which consisted of a telephone set 121, a terminal 151, PBX12, Ethernet 15, and ITS13, connected with a public telephone network 2, or the Internet/intranet 3, and was connected to public telephone networks 2 other than in-house network 1, or the Internet/intranet 3.

[0016] Moreover, PBX12 holds telephone sets 121A, 121B, and 121C, and offers voice communication service which performs not only the private branch exchange but exchange with the exterior. Ethernet 15 holds the personal computer terminals 151A and 151B, and it performs the data transmission services which attain high-speed-data transmission, planning collision prevention by CSMA/CD by 10BASE-5, 10BASE-F, 100BASE-T, etc. Moreover, Ethernet 15 may constitute LAN containing a token ring, ATM network exchange, FDDI, etc., and may contain WAN and the wireless LAN of a wide area network.

[0017] Furthermore, ITS13 holds PBX12 and Ethernet 15, and offers joint communication service of the voice via the Internet, and data.

[0018] PBX12 and ITS13 A transmitting line (T line is called hereafter) and a receiving line (R line is called hereafter), The cable which makes one pair a transmitting initiation line (SS line is called hereafter) and four signal lines of an arrival-of-the-mail initiation line (SR line is called hereafter) It connects by (four lines are called hereafter), and PBX12 and a public telephone network 2 are connected by 2 of T line and R line lines, and ITS13, and the Internet/intranet 3 are connected by the cables 31, such as a coaxial cable of arbitration, and a twisted pair wire, an optical fiber.

[0019] The [explanation of actuation of this operation gestalt] PBX 12 has the function bypassed to a public telephone network 2 at the time of a private line trunk busy as conventional technology. This actuation is explained using drawing 1 .

[0020] Three sets of telephone set A121A, B121B, and C121C are connected to PBX12, PBX12 and ITS13 are two lines [four] 14X and 14Y, and PBX12 and a public telephone network 2 are connected by one line [two] 21.

[0021] First, if telephone set A121A carries out call origination towards other telephone sets in the condition that anything does not have a message, through ITS13 by the Internet / intranet 3 course, PBX12 will talk over the telephone by SR line of an arrival-of-the-mail initiation line choosing 4 line X14X of an Off condition. The sequence to a message is shown in drawing 2 . If telephone set A121A and dial-in of a phase hand's telephone number is carried out in usual call origination actuation of drawing 2 PBX12 turns on SS line of a transmitting initiation line to ITS13 according to the telephone number, and connect with ITS to which a phase hand's telephone set is connected through the Internet / intranet 3, and it turns on a phase hand's ITS. If off-Hook [a phase hand's telephone set / a ringing is

carried out and / a phase hand's telephone set], SS line of a transmitting initiation line is turned on from a phase hand's PBX. A connection response is connected to ITS13 through the Internet / intranet 3, SR line is turned on, a ring back tone is generated in telephone set A121A, and a phase hand's telephone set and a message are attained henceforth. In this way, when T line of a transmitting line and R line of a receiving line turn on and all the 4 line X14X turns on, the message by the mutual telephone set is maintained.

[0022] Next, if telephone set B121B carries out call origination towards the phase hand telephone set of an external Internet telephone through the Internet / intranet 3, SR line will choose 4 line Y14Y of an Off condition, and PBX12 will talk over the telephone. Thereby, the SR line Y of 4 line Y14Y changes to On.

[0023] If telephone set C121C carries out call origination of all the four lines X and Y towards the phase hand telephone set of an external Internet telephone during use by this in-house network 1 through the Internet / intranet 3, since all SR lines are in On condition, PBX12 will change a number to be dialed into the telephone number of a public telephone network 2 with the telephone number translation table set up beforehand, and will talk over the telephone, without letting a dedicated line pass.

[0024] On the other hand, ITS13 has the function which encapsulates the voice of PBX12, and the data of Ethernet 15 with the IP (Internet Protocol) frame, and communicates by the Internet / intranet 3 course as conventional technology. It explains using drawing 1 . PBX12 and Ethernet 15 are connected to ITS13, and the Internet / intranet 3 is connected by the cable 31 of arbitration. The voice of PBX12 is encoded / decrypted with the Internet interface 130, and communicates by the Internet / intranet 3 course with the IP frame of fixed length. On the other hand, the data of Ethernet 15 communicates with the IP frame of arbitration length with the Internet interface 130 at the Internet / intranet 3 course.

[0025] With such a configuration, since it gives priority to the voice communication than to which greater importance is attached to real-time requirement when the voice communication of PBX12 and the data communication of Ethernet 15 occur in coincidence, in the Internet interface 130, ITS13 divides the queue of voice and data, and a priority control is performed or it also has the function which divides a data frame into a short frame and lets a voice frame pass between data frames.

[0026] Moreover, in the voice communication than to which greater importance is attached to real-time requirement, if the receiving gap of a voice frame is sparse, since it swings when reproducing voice, or the noise of "BUTSUBUTSU" enters and voice quality worsens, when the receiving gap of a voice frame exceeds fixed time amount, in the Internet interface 130, it also has the delay fluctuation control function of discarding the voice frame.

[0027] With this operation gestalt, to the above-mentioned function, in addition, in order to raise Internet-based phone services, using effectively the detour function to the public telephone network at the time of the private line trunk busy of PBX12 The network control 131 which supervises the traffic volume of the frame which occurs in an in-house network 1 in ITS13, and flows the arbitration cable 31 to it, or supervises the loaded condition of the Internet / intranet 3, The timer 132 which sets up time of day, and three functions of the busy control 133 which controls the use propriety of the Internet / intranet 3, SR line of the arrival-of-the-mail initiation line outputted to PBX12 from the Internet interface 130 of ITS13, the signal line outputted from busy control 133, and OR circuits 134X and 134Y for joining together in OR logic are added.

[0028] The voice which generates a network control 131 in an in-house network 1, and is communicating by the Internet / intranet 3 course, While supervising the line failure of the traffic volume of data, and the cable 31 of arbitration, and the number of frame abandonment by fluctuation absorption In order to judge the loaded condition of the Internet / intranet 3, when the time of day and response time are learned for every message and a response does not come on the contrary within convention time amount, it is judged as loaded condition. The time of day is registered into a load time-of-day table, or if it is less than convention time amount, the time of day will be deleted from a load time-of-day table.

[0029] Moreover, the ping frame is periodically transmitted to the points (a provider's server, the communications-partner point, etc.) of arbitration, time amount (round-trip-delay time amount is called

hereafter) until a response comes on the contrary is observed, it registers with an above-mentioned load time-of-day table, or a signal is changed into On condition on real time at busy control 133, and, in within convention time amount, a signal is changed into an Off condition.

[0030] Moreover, when the traffic volume of the cable 31 of arbitration exceeds default value, a line failure is detected or the number of voice frame abandonment per unit time amount by fluctuation absorption control exceeds the number of conventions, a signal is changed into On condition to busy control 133, and when traffic volume and the number of voice frame abandonment are less or line failure restoration is detected, a signal is changed into an Off condition.

[0031] The timer 132 predicts and sets up the time zone of the overload of the Internet / intranet 3 beforehand (from 22:00 to 8:00 [for example,]), and the set-up time zone makes busy control 133 generate a signal.

[0032] When it considers as a busy condition when beyond the convention time amount of the round-trip-delay time amount which a network control 131 outputs in consideration of a SURESHI hold from a carrier beam signal is carrying out arbitration time amount continuation from the network control 131 or the timer 132, and less than convention time amount is carrying out arbitration time amount continuation, busy control 133 generates the signal whose Internet / intranet 3 are busy conditions, and changes all SR lines into On condition through OR circuits 134X and 134Y, such as canceling a busy condition.

[0033] Since the signal which notifies a busy condition is notified to PBX12 through OR circuits 134X and 134Y, when there are four lines in use by message, even if it is continued and a message completes the message, SR line of an arrival-of-the-mail initiation line does not return to an Off condition.

[0034] PBX12 judges that all SR lines are in On condition with a private line trunk busy, a number to be dialed is changed into the telephone number of a public telephone network 2 with the telephone number translation table set up beforehand, and it talks over the telephone, without letting a dedicated line pass.

[0035] The call origination actuation at the time of this trunk busy is explained referring to drawing 2 . For example, since all SR lines of ITS13 are ON states when telephone set A121A and dial-in of a phase hand's telephone number is carried out, it connects with a direct public telephone network, and PBX12 receives a message in a phase hand's PBX, and generates a ringing to a phase hand's telephone set. If off-Hook [a phase hand's telephone set], the reply signal will be transmitted to PBX12, a ring back tone will be generated in telephone set A121A, and a phase hand's telephone set and a message will be attained henceforth. It lets a public telephone network 2 pass, and the message by the mutual telephone set is maintained. In this case, although explained that a phase hand's telephone sets are this in-house network and the same network, when a phase hand's telephone set is connected to the provider and the public telephone network and this in-house network is not a busy condition, through above-mentioned Internet/intranet, an Internet telephone will be possible and it will talk over the telephone through a public telephone network mutually at the time of a busy condition.

[0036] The telephone number defined by the configuration and actuation of the above each part by the dedicated line connected to the Internet / intranet 3, By registering beforehand correspondence with the telephone number of a public telephone network 2 into a telephone number translation table, and transforming the telephone number into the telephone number of a public telephone network 2 by turns PBX of the private-telephone-network exchange which has a detour function to a public telephone network 2 when a private line trunk is a busy condition, By the in-house network which has the Internet telephony server ITS which unifies the Ethernet for the communication link between terminals, the voice of PBX, and the data of Ethernet, and communicates with the Internet/intranet By ITS13 which operates also as a provider, the high time zone of the probability for a busy to occur is set as a busy condition, and it connects with the priority to a public telephone network.

[0037] Moreover, it has the congestion detour function of the Internet telephone of making it bypass from PBX12 to a public telephone network 2 by having the function to judge that the Internet / intranet 3 is in loaded condition, and pretending to be it to PBX12 by the case where the Internet telephone of the Internet / intranet 3 course is used, at a private line trunk busy condition, when it is judged to the message of those other than in-house network 1 that it is in an overload condition, without letting the

Internet / intranet 3 pass.

[0038] Here, the function to judge that the Internet/intranet is loaded condition has the following logic and load time-of-day tables, [for the purpose of these], it uses properly, or it is combined, and provides ITS13 with service.

(1) When the time of day and response time are learned for every message and a response does not come on the contrary within convention time amount, judge it as loaded condition and register the time of day into a load time-of-day table. On the other hand, if it is less than convention time amount, the time of day will be deleted from a load time-of-day table. If a load time-of-day table is interlocked with a timer and becomes the registered time of day, it will activate a busy signal.

(2) Transmit the Ping frame to the points (a provider's server, the communications-partner point, etc.) of arbitration periodically, learn the time of day and response time, and when it registers with a load time-of-day table like (1) or there is no response from the Internet/intranet actually from a network control, activate a busy signal through busy control on real time.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is configuration block drawing of the in-house network by this invention.
[Drawing 2] It is the connection flow chart of the in-house network by this invention.
[Description of Notations]
1 In-house Network
2 Public Telephone Network
3 Internet/Intranet
12 Private Branch Exchange (PBX)
121A, 121B, 121C Telephone set
13 Internet Telephony Server (ITS)
130 Internet Interface
131 Network Control
132 Timer
133 Busy Control
134 OR Circuit
14 Four Lines
15 Ethernet
151 Personal Computer Terminal
21 Two Lines
31 Cable

[Translation done.]

* NOTICES *
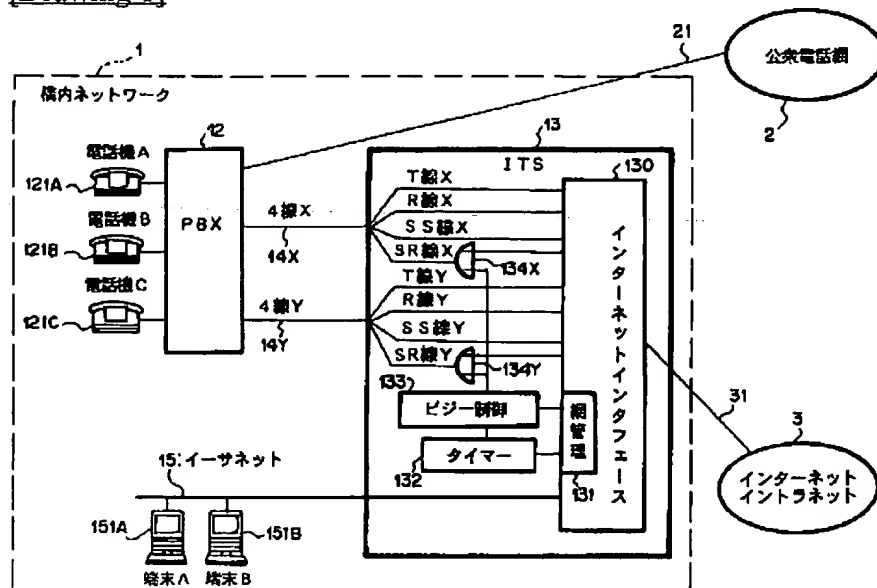
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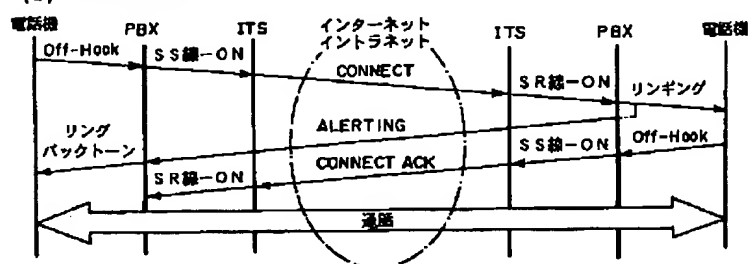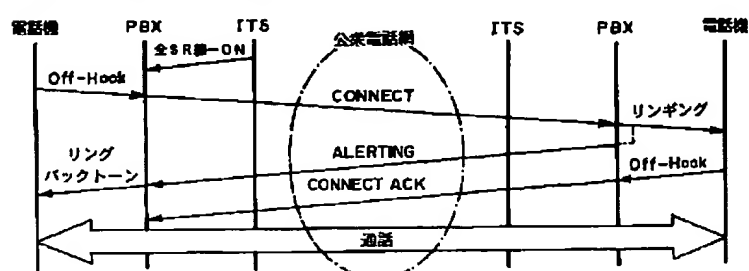3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]

[Drawing 2]

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